

verifications to be 87.5 per cent. The percentage of verifications for the four elements have been: weather, 90.7; wind, 83.7; temperature, 88.7; barometer, 87.0. The percentage of verifications by geographical districts have been: New England, 87.6; Middle States, 88.4; South Atlantic States, 87.3; East Gulf States, 87.2; West Gulf States, 89.1; Lower Lake region, 85.3; Upper Lake region, 87.4; Tennessee and Ohio valley, 86.8; Upper Mississippi valley, 89.4; Lower Missouri valley, 86.8. Of the 3,704 predictions that have been made, 63, or 1.7 per cent., are considered to have entirely failed; 16, or 4.4 per cent., were one-fourth verified; 409, or 11.1 per cent., were one-half verified; 295, or 8.0 per cent., were three-fourth verified; 2,776, or 75.0 per cent., were fully verified, so far as can be judged from the tri-daily weather maps.

Cautionary Signals.—During the month, 234 Cautionary Signals were displayed; 207, or 88.4 per cent., were justified by subsequent hourly velocities of 25 miles or over at, or within 100 miles of the station.

Cautionary Off-Shore Signals—thirty-two signals not included in the preceding—were ordered up as Cautionary Off-Shore Signals; 25, or 78.1 per cent. of these were justified both as to velocity and direction. Sixty-two Cautionary Signals were changed to Off-Shore Signals, and as to velocity, are considered with the Cautionary,—as to direction, 58 or 84 per cent., were justified. Fifty-nine cases were reported, generally from scattered stations, of winds of 25 miles or over when signals were not ordered.

NAVIGATION.

In the table on the right-hand of chart No. 111, are given the highest and lowest readings on the Signal Service river gauges during the month, with dates of same, from an examination of which it will be seen that the rivers have continued quite low throughout.

Ice in Rivers.—Floating and shore ice was reported in the Missouri and Red river of the North, from the 26th to the 29th, at Fort Rice, Bismarck and Pembina; at Morriston, Dak., the James river was frozen over on the 27th, but on the 31st all the ice had disappeared.

High Tides.—Portsmouth, N. C., 3d, 4th; Tybee Island, S. C., 27th, 29th; Cape May, N. J., 23d, highest tide since 1821, all small objects swept before it; Dover, Del., 23d, highest tide known for years; Mt. Desert, Me., 24th, 28th; Flushing, N. Y., 23d, in Flushing Bay, three feet higher than usual.

ATMOSPHERIC ELECTRICITY.

Thunder-Storms.—1st, Minn., Ill., Ind., Ia., Mo., Neb., Wis., Ariz., Mich. 3rd, Kan. 4th, Ill., Kan., Mo., Vt. 5th, Col., Kan., Mo. 6th, Ia., Mo. 7th, N. C., Va. 8th, Tex., Ill., Ia., Mich., Wis., Kan. 9th, N. Y., Conn., Ill., Ind., Ky., Me., Mass., Mo., N. H., N. J., Ohio, Vt., Pa. 10th, Ill., Ia., Kan., Mo., Neb., Wis. 11th, Ind., Ky. 12th, Ia., Wis. 13th, Ill., Ia., Mo., Ohio. 14th, Ia., Mich., Ohio, Wis. 15th, Dak., Me., Mich., Minn., Ill., Ia., Kan., Mo., Neb., N. Y., Wis. 16th, Ill., Ia., Kan., Mich., Mo., N. Y., Wis. 18th, Ia., Va. 22nd, Va. 23rd, Va. 25th, Ind. 26th, Ill. 27th, N. J. 30th, Tenn., Va.

Anroras.—Bismarck, Dak., 21st; Madison, Wis., 25th; Escanaba, Mich., 19th; Eastport, Me., 21st; Ft. Wayne, Ind., 12th, 31st; Nora Springs, Ia., 16th; Cape Vincent, N. Y. 22nd; Garrettsville, Ohio, 11th; Woodstock, Vt., 28th; Manitowoc, Wis., 19th.

Telegraphic Communication Interfered with by Atmospheric Electricity.—Boerne and McKavitt, Tex., 8th.

OPTICAL PHENOMENA.

Solar Halos.—1st, Ill.; 2d, N. Y., Md., Ohio; 3d, Cal., Iowa; 4th, Ohio, R. I., Conn.; 5th, R. I.; 6th, Iowa; 7th, Conn., Ill., Ind., Iowa, Md., N. J., N. Y., Ohio, Vt., Md., Dak., Ga., R. I.; 8th, Conn., Ind, Me., N. Y., Ohio, Md., Dak., Ga., R. I.; 9th, Ky., Mass., Md., Fla., S. C., Ga.; 10th, Ind., Ohio, Md., N. C.; 11th, Conn., Me., Miss., N. J., N. Y., Ohio, R. I.; 12th, Ind., Iowa; 13th, Ind., N. Y., Ohio, Md.; 16th, N. Y., Vt., Md., N. C., S. C., R. I.; 17th, Conn., N. J., N. Y., R. I.; 20th, Md.; 22d, N. H., N. J.; 25th, N. Y., Ohio; 26th, N. J., N. Y., Pa.; 27th, N. Y., Pa.; 29th, Ind., N. Y., Ohio; 30th, Md.

Lunar Halos.—1st, N. Y. 2nd, Dak. 3rd, Ill. 4th, Iowa, Mass., Vt., R. I. 5th, Ga., Ill., Ky., Miss., Vt., Neb. 6th, Ill., Ky., Mich., Miss., N. Y., Vt., Neb., Mo., Ohio. 7th, Fla., Ind., Maine, Mass., Ohio, Neb., Ill., Conn. 8th, Conn., Fla., Maine, Mass., Ohio, Vt., Tex., Fla., Ill., S. C., Ga., N. J., R. I. 9th, Conn., N. C., Vt., Md., Neb., Fla., Mich., N. Y., Ohio, S. C., Ga., Pa., Mass. 10th, Ill., Ind., Iowa, Md., Mo., N. J., N. Y., N. C., Ohio, Pa., Vt., Md., N. H., Conn., Maine. 11th, Maine, Ohio, N. Y. 12th, Ill., Iowa, Wis., Neb., Mo., Pa. 13th, Conn., Ind., Iowa, Mass., N. Y., Ohio, Vt., R. I. 14th, Conn., Maine. 15th, Iowa, N. Y., Maine. 16th, Ind., Iowa, Maine. 17th, N. Y., Ill. 21st, N. Y. 22nd, Md., Maine. 24th, N. Y. 28th, Ind. 29th, Me. 30th, Neb. 31st, N. J., Wis.

Mirage.—Burlington, Vt., 20th; New London, Conn., 2nd, 3rd, 5th, 6th, 7th, 25th, 28th, 29th.

MISCELLANEOUS PHENOMENA.

BOTANICAL.—*Maine*—Cornish, 14th, forest foliage changed color; 10th, field strawberries and dandelions in bloom since the middle of last month, and some ripe fruit. *Massachusetts*—Somerset, 1st to 10th, harvesting corn. Fall River, in bloom, 21st, pear and some forest trees; 26th, trailing or butus in full bud. Westboro, 1st to 29th, flowers blooming in field and garden. Waltham, 7th to 25th, forest leaves falling rapidly, 26th, almost stripped of leaves. *Michigan*—Northport, 31st, fall crops, corn, potatoes and buckwheat

very light. *Missouri*—Corning, 31st, corn crop large, winter wheat in fine condition. *Mississippi*—Fayette in bloom, 10th, peach, 24th, roses, chrysanthemums, japonicas, &c.; 28th, second crop of mulberries. *New Hampshire*—Dunbarton, 31st, potato crop very poor, apples very abundant, largest crop ever known in this section. *New York*—Flushing, in bloom, 24th, pear; Wappingers Falls, 1st to 14th, pears, 15th, currants, 21st, grapes and dandelions, 29th, marigolds and dahlias up to this date; 17th, hickory nuts and chestnuts ripening, green currant on bushes, grass still green; 19th, second crop of strawberries; 21st, spring trees in bud. Palermo, 1st, second crop of strawberries; 10th, second crop of raspberries; 6th, second crop of blackberries. Cape Vincent, 15th, second crop of apples, large as walnuts, second crop of barley harvested. *Ohio*—Ruggles, 31st, forest foliage falling, crops all good, except potatoes, which are nearly a failure; wheat looking well, but somewhat late. Cleveland, 1st, foliage fading. Ringgold, 31st, wheat medium size, corn crop excellent, grass large growth. *Texas*—Clarksville, 31st, cotton crop very good in some sections, but in others injured by boll worm; harvesting progressing favorably. Melissa, cotton crop mostly gathered, weather favorable, harvesting corn progressing rapidly; most delicate vegetation still unharmed by frost; roses in bloom. *Virginia*—Keswick, 31st, foliage generally killed, leaves falling fast; heavy crop of persimmons; wheat very backward; winter oats looking well; sweet and irish potatoes good crop; turnips good and cabbage poor. Dover Mines, 5th, harvestin corn; 10th to 31st, sowing wheat; 18th, wheat coming up. *Vermont*—West Charlotte, 4th, 21st, second crop of raspberries; in bloom, 31st, dandelions; 24th, forest leaves falling. Stratford, 12th, second crop of raspberries; in bloom, 23d, strawberries.

INSECTS.—*Katydid*s: Fayette, Miss., 25th, last heard; Wappingers Falls, N. Y., 8th, 9th. *Cotton worm*.—Brookhaven, Miss., 8th appearing; 11th, cotton fields stripped of leaves. *Locusts*.—Denver, Col., no locusts seen during the entire month; Genoa, Neb., 1st, 2nd, flying SE; Fort Sill, Ind. Ty., 1st to 4th, very numerous and depositing eggs; 6th, 7th, going N. in great numbers; 11th, few going S; continued numerous until 14th; 15th to 26th, diminishing; 29th, disappearing; 30th, going S. in great numbers; 31st, "locusts have remained in this vicinity during the whole month, but diminished in numbers gradually, toward the latter part of the month they were about one third as numerous as at the beginning. They have been depositing their eggs during the entire month, and with favorable circumstances for hatching, this section with young locusts next spring." Decatur, Tex., 18th, locusts passing over station, but none alighting. *Beetles*.—Pembina, Dak., 11th, millions flying over station and swimming in Red river. *Butterflies*.—Daytona, Fla., 2nd, 14th, flying S.

BIRDS.—*Owls*.—Oregon, Mo., 13th; Wappingers Falls, N. Y., 9th. *Meadow-larks*.—Oregon, Mo., 14th, 15th. *Geese*.—North Platte, Neb., 20th, 24th, 28th, flying S.; Chicago, Ill., 28th, S.; Cairo, Ill., 9th, 17th, 23d, S.; Morgantown, W. Va., 31st, S.; Camp Sheridan, Neb., 23d, 24th, 25th, S.; Madison Bks., N. Y., 24th, S.; Princeton, Cal., 13th, numerous; Mystic, Conn., 2d, S.; Laconia, Ind., 18th, S.; New Corydon, Ind., 30th, S.; Monticello, Iowa, 21st, 28th, S.; Afton, Iowa, 14th, 30th, S.; Nora Springs, Iowa, 4th, S.; Tabor, Iowa, 31st; Boonsboro', Iowa, flying daily; Holton, Kan., 2d, 16th, 23d, S.; Creswell, Kan., 4th, 13th, 17th, 18th, 26th, S.; Independence, Kan., 2d, 21st, S.; Morse, Kan., 1st, S.; Empire City, Kan., 17th, S.; Mt. Desert, Me., 23d, S.; Oregon, Mo., 12th, 21st, 31st, S.; Lebanon, Mo., 3d, S.; Plattsmouth, Neb., 3d, S.; Palermo, N. Y., 29th, S.; North Volney, N. Y., 22d, S.; Hulmeville, Pa., 17th, Catawissa, Pa., 19th, S.; Melissa, Tex., 18th, S.; Keswick, Va., 31st, S.; Dover Mines, Va., 17th, 19th, 20th, S.; Wytheville, Va., 6th, 10th, S.; Waupaca, Wis., 17th, 24th to 26th, S.; San Diego, 12th, SE; Red Bluff, California, 11th, 12th, S.; Fort Gibson, Indian Territory, 27th, S.; Corsicana, Tex., 20th, 25th, S.; Keokuk, Iowa, 9th, S.; Davenport, Iowa, 26th, S.; Cape Henry, Va., 11th, 17th, S. *Ducks*.—Pembina, Dak., 23d, flying, S.; Dubuque, Iowa, 18th, S.; Madison, Wis., 1st, S.; Portsmouth, N. C., 26th, in great numbers; Tybee Island, Ga., 20th, S.; Camp Sheridan, Neb., 23d, S.; Daytona, Fla., 20th, S.; Monticello, Iowa, 21st, 28th, S.; Boonsboro', Iowa, flying daily; Creswell, Kan., 20th, S.; Empire City, Kan., 17th, S.; Oregon, Mo., 31st, S.; Brookhaven, Miss., 8th, from N.; Fort Gibson, Ind. Ty., 27th, S.; Castroville, Tex., 11th, S.; Keokuk, Iowa, 9th, S.; Cape Henry, Va., 11th, 17th, S. *Crows*.—Mt. Desert, Me., 25th, S.; Palermo, N. Y., 12th, S.; Ringgold, Ohio, 25th, 29th, 30th, S.; North Lewisburg, Ohio, 24th, S.; Norwalk, Ohio, 18th, 31st, S. *Sparrows*.—Waltham, Mass., 18th, S. *Swallows*.—Tybee Island, Ga., 17th, in great numbers; Somerset, Mass., 25th, S.; Oregon, Mo., 13th, S.; Wappingers Falls, N. Y., 9th, disappeared. *Cranes*.—Monticello, Ia., 29th, flying S.; Boonsboro, Ia., flying daily; Holton, Kan., 25th, S. *Quails*.—Oregon, Mo., 14th. *Snow Birds*.—Pembina, Dak., 30th; Fayette, Miss., 28th, first seen; Lebanon, Mo., 10th, appearing; Flushing, N. Y., 2nd, first appearance. *Pigeons*.—Dover Mines, Va., 9th, appeared. *Black Birds*.—Rochester, N. Y., 14th, flying SE.; Anna, Ill., 7th, S.; Monticello, Ia., 24th, S.; Cornish, Me., 9th, S.; Waltham, Mass., 20th, S.; Oregon, Mo., 13th; West Charlotte, Vt., 19th, immense flock flying S. *Brants*.—Boonsboro, Ia., flying daily; Holton, Kan., 16th, 23rd, S.; Independence, Kan., 30th, S. *Robins*.—Monticello, Ia., 13th, flying S.; Oregon Mo., 17th, 31st, S.; Keswick, Va., 31st, S.; Dover Mines, Va., 10th, 15th, S. *Blue Birds*.—Oregon, Mo., 31st, flying S.; Wappingers Fall, N. Y. 6th; Palermo, N. Y., 19th. *Phebes*.—West Charlotte, Vt., 16th, disappeared.

METEORS.—Boise City, Idaho, 30th; Milwaukee, Wis., 4th; Gainesville, Ga., 10th; Vevay, Ind., 25th; New Corydon, Ind., 23rd, 28th, 29th; Arlington, Ind., 22nd, 24th to 31st; Topeka, Kan., 20th; Woodstock, Md., 1st, 2nd, 6th, 8th, 14th, 16th, 18th, 19th, 20th, 21st, 24th to 27th; Sandy Springs, Md., 6th; Fayette, Miss., 1st, 3rd, 13th, 21st, 23rd, 24th, 31st; Freehold, N. J., 24th, 26th; Vineland, N. J., 1st; Waterburg, N. Y., 6th, 16th, 24th; Palermo, N. Y., 1st; Hector, N. Y., 21st; North Volney, N. Y., 25th; Wappingers Falls, N. Y., 6th, 13th, 16th, 26th, 29th; South Hartford, N. Y., 29th; Vernon Centre, N. Y., 24th; Westville, Ohio, 14th; North Lewisburg, Ohio, 20th. At Navassa, W. I., on the 8th, about 9 p. m., a brilliant meteor was observed, moving from E. to W.

Polar Bands.—New Corydon, Ind., 8th, 10th, 29th; Laconia, Ind., 13th; Guttenburg, Iowa, 31st; Gardiner, Maine, 9th; Westboro', Mass., 15th; Oregon, Mo., 31st; Plattsmouth, Neb., 31st; Auburn, N. H., 11th, 23rd; Freehold, N. J., 10th; Woodstock, Vt., 7th, 9th, 11th, 13th, 15th; Wytheville, Va., 3rd, 6th, 13th, 14th, 23rd, 24th; Washington, D. C., 2nd, 6th, 15th, 19th, 31st.

Zodiacal Light.—Daytona, Fla., 1st, 9th, 25th, 30th; New Corydon, Ind., 1st, 2nd, 3rd, 6th, 7th, 8th, 24th, 25th, 28th; Monticello, Ia., 2nd, 11th, 18th; Waterburg, N. Y., 8th, in the morning; Cape Vincent, N. Y., 17th.

Prarie and Forest Fires.—Neah Bay, Wash. Ty., 3rd, recent rains had extinguished the forest fires in that section; Hat Creek, Wy. Ty., 8th; Los Angeles, Cal., 21st, 24th, raging in mountains south of Anaheim; San Diego, Cal., 17th, on hills south-east of station; 20 to 40 miles east of Pike's Peak, Col., 8th, 12th, 13th, 23rd; North Platte, Neb., 8th, 13th, 19th, 20th; Pembina, Dak., 3rd, 4th, 5th, 6th, 8th, 9th, (10th, telegraph poles burned down,) 24th, 27th; Lead City, Dak., 14th; Ft. Gibson, Ind. Ty., 1st, 11th, 17th, 18th, 19th, 21st, 22nd, 23rd, 24th, 25th, 31st; Dodge City, Kan., 2nd, 13th, 20th, 21st, 22nd, 29th, 30th, 31st; Yankton, Dak., 3rd, 11th, 12th, 20th, 22nd; Bismarck, Dak., 5th, 6th, 7th, 8th, 18th, 19th, 20th; Corsicana, Tex., 25th; Breckenridge, Minn., 6th, (9th, office and part of village threatened;) Camp Sheridan, Neb., 8th, 9th, 10th, 12th; Summit, Col., 26th, large forest fires; Creswell, Kan., 1st, 6th, 10th, 19th to 25th, 28th; De Soto, Neb., numerous throughout month; Genoa, Neb., 10th, 12th, 13th, 15th.

Earthquakes.—San José de Costa Rica, August 30th, 0:23 a. m., feeble shock. September, night of 8th and 9th, "reverberations;" 24th, 5 a. m. and 6:55 p. m., feeble shocks; 29th, 7:45 a. m., feeble shock, 7:15 p. m., feeble shock. October 11th, 5 p. m., feeble shock. A letter dated Alton Island, Alaska, September 1st, states "that frequent shocks occurred during the summer in conjunction with renewed activity of the numerous volcanoes of the Aleutian Islands; Amukhta and Ichegula were emitting smoke and occasionally fire and lava; on the 29th ult., the village of Makuslin, on Unalaska Island, was destroyed by earthquake shocks and tidal waves." September 30th, United States Naval Hospital, Yokohama, Japan, 5:32 a. m., slight shock. October 2d, Santiago de Cuba, slight shock. 4th, 2:30 a. m., along both sides of the Hudson, from Marlboro' to Peekskill—at West Point people were aroused from sleep,—at Garrison's, persons aroused, house jarred, furniture moved and crockery rattled,—at Highlands, people aroused,—at Peekskill, 2:30 a. m., shock seemed to come from north and pass south, the earth seemed to rock for several seconds, houses were shaken and crockery rattled,—at Marlborough, farmers report hearing rumbling, resembling blasting of rocks, for two days previous, main shock felt at 2:30 a. m.,—at Newburg, 2:40 a. m., rumbling noise followed by sharp shock and another rumbling, the whole lasting about half a minute, windows rattled and people were aroused from sleep,—at Cold Spring shock lasted several minutes and buildings were shaken,—at Ardenia, 2 to 3 a. m., distinct shock,—the shock was also specially felt in the hilly region (the "Highlands") to the west of the river. 21st, Sacramento, Cal., 5:40 p. m., two distinct shocks from north to south, lasting a few seconds.

Sunsets.—The characteristics of the sky at sunset, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Corps stations. Reports from 125 stations show 3,844 observations to have been made, of which 42 were reported doubtful, of the remainder 3,328 or 86.6 per cent, were followed by the expected weather.

Sun Spots.—Monthly record of observations by Mr. D. P. Todd, Nautical Almanac office, Washington D. C.

October, 1878.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
1st, 4 p. m...	0	0	0	0	0	0	0	0	Faculae. Faculae.
2nd, 5 p. m...	0	0	0	0	0	0	0	0	
3rd, 5 p. m...	0	0	0	0	0	0	0	0	
4th, 4 p. m...	0	0	0	0	0	0	0	0	
5 p. m...	0	0	0	0	0	0	0	0	
6th, 1 p. m...	0	0	0	0	0	0	0	0	
8th, 4 p. m...	0	0	0	0	0	0	0	0	
9th, 4 p. m...	0	0	0	0	0	0	0	0	
10th, 2 p. m...	0	0	0	0	0	0	0	0	
12th, 5 p. m...	0	0	0	0	0	0	0	0	
13th, 1 p. m...	0	0	0	0	0	0	0	0	
14th, 4 p. m...	0	0	0	0	0	0	0	0	
15th, 3 p. m...	0	0	0	0	0	0	0	0	
16th, 4 p. m...	0	0	0	0	0	0	0	0	
18th, 4 p. m...	0	0	0	0	0	0	0	0	
19th, 4 p. m...	0	0	0	0	0	0	0	0	
28th,.....	1	1	0	0	1	1	1	1	
29th,.....	1	2	0	0	0	0	2	3	
31st,.....	0	0	0	0	0	0	1	1	

Prof. Gustavus Hinrichs, at Iowa City, Iowa, reports: "No sun-spots were seen until the last day of the month, when a very large round spot was seen so far from the sun's rim that it would have been visible to us on the 29th, had the weather permitted the examination of the sun's disk." Mr. J. Harcourt, at Wappinger's Falls, N. Y., examined the sun's disk on the 6th, 13th and 20th, but saw no spots. Mr. H. D. Gowey, at North Lewisburg, Ohio, observed one spot on the 29th. At Waterburg, N. Y., Mr. David

Trowbridge, observing with a refractor and power of 55 diameters, reports no spots on October 3rd, 5th, 6th, 7th, 8th, 11th, 13th, 17th, 20th, 21st, 22nd, 24th, 25th, 26th, 28th, 29th, observations generally made in the morning. November 1st, 1 p. m., saw one spot one third the way across the solar disk. 2nd, same spot still visible.

NOTES AND EXTRACTS.

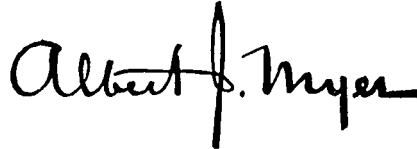
Lightning Conductors.—A very useful paper on lightning conductors was read at the British Association for the Advancement of Science by R. Anderson. He asserts that the terrible losses that are caused by lightning is to be attributed to the grossest negligence in neglecting to provide lightning conductors, in placing them in the wrong positions, and in omitting to have them properly tested and protected so as to secure their constant efficiency. These matters are attended to very systematically in France, but much neglected in England and America.

Sunspots and Rain-fall—A paper by C. Meldrum of some interest upon this subject is published in a recent number of "Nature." He therein compares Wolf's sunspot numbers with the rain-fall at Madras 1816-77; Edinburgh 1824-72; Paris 1824-1872, and concludes that there is an intimate connection between sunspots and rain-fall. This paper is followed by one by Mr. F. Chambers who compares the Bombay barometric observations with the sunspot record, and thinks that they lead to the conclusion that the sun is hottest about the time of maximum spots, and coldest at time of minimum spots.

Auroras.—In the report of C. Weyprecht on the aurora observations of the Austro-Hungarian Arctic Expedition, 1872-4, he states that after careful study he finds no connection between the aurora and the subsequent wind or weather.

Balloons.—An important work on the application of the balloon to science and meteorology has just been published by Tissandier of Paris.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.



Brig. Gen. (Bvt. Assg^d.) Chief Signal Officer, U. S. A.

Copy furnished for